night something more will be seen." At eight o'clock on the evening of January 3 the comet was in R.A. 47°·5, declination 1°·5 south, distant from the earth 0·276; the moon was at full two days previously, so that the tail might have been in great measure overpowered by her light in the indifferent state of the sky. Pepys has no further reference to the comet till March 11, when the "Diary" says: "To Gresham College, where Mr. Hooke read a second very curious lecture about the late comet; among other things proving very probably that this is the very same comet that appeared before in the year 1618, and that in such a time probably it will appear again, which is a very new opinion; but all will be in print." We do not remember to have met with other reference to this opinion of Hooke's, though probably such must exist; and it is not easy to explain upon what grounds he founded the idea. The comet referred to was the third of 1618, which, to use Pingré's phrase, almost exercised the printing-press as much as that of 1664. It was observed by Harriot at Sion House, Isleworth, or, as it was then called, Thistleworth.

GEOGRAPHICAL NOTES

OUR readers may have noticed that Dr. Holub had met with unexpected difficulties at the Cape in the prosecution of his journey into the African interior, the Cape authorities insisting on payment of the full duty on the traveller's scientific equipment. It will be seen from the following communication, which has been sent us for publication, that the difficulty has been happily and promptly settled:—"Downing Street, February 2, 1884.—Sir,—I am directed by the Earl of Derby to acknowledge the receipt of your letter of the 29th ult., relative to the exploring expedition undertaken by Dr. Holub in South Africa; and I am to acquaint you, for the information of Sir Joseph Hooker, that a telegram has been sent to the officer administering the Government of the Cape of Good Hope, requesting that special concessions may be made in respect to the Customs duties, and that support may be afforded to Dr. Holub in the prosecution of his enterprise. A despatch to the same effect will follow by the outgoing mail.—I am, &c. (signed), ROBERT G. W. HERBERT.—The Assistant Director, Royal Gardens, Kew."

IN the *Bolletino* of the Italian Geographical Society for January an account is given of a curious manuscript recently presented to the Society by Count Pietro Antonelli. It forms a bulky codex of 125 sheets of parchment, consisting mostly of formulas and magic incantations written in the old Giz (Ethiopic) language with a large admixture of Amharic. Amongst the contents is also the *Aud Neges't*, or Royal Circular, comprising sixteen circles, each of which occupies a whole page of the codex. All are divided into sixteen segments, each containing some text on the various incidents of human existence, which are afterwards expounded in greater detail. Then come thirty chapters, each divided into fifteen lines, every one of which contains some sentence or aphorism. The donor has received the King Humbert gold medal for the scientific work accomplished by him in the Italian settlement of Assab and neighbouring district. The same number of the *Bolletino* contains a description of the interesting collection presented last year to the prehistoric ethnographic museum at Rome by M. van Oordt of Leyden. This collection comprises a beautiful series of amulets, musical instruments, costumes and all kinds of personal ornaments used by the Maronites of the Lebanon, the Druses of Hauran and other Syrian populations. Some have a considerable intrinsic value, while others are noteworthy for their rarity and the elegance of their forms and ornamentation. One of the most remarkable objects is the girdle worn by rich Bedouin and Druse brides, consisting of a broad many-coloured silken sash with a large silver clasp nearly oval at both extremities. It is opened by means of a needle, and embellished with conic filigree buttons and silver chains, from which are suspended little globules, crescents, and other charms.

THE *Sydney Morning Herald* of December 27, 1883, says:—An exploring party, under the leadership of Mr. Charles Winnicke, an experienced explorer and bushman, has just made a successful journey through a large portion of unknown country in the interior of Australia. The party was provided with camels and horses, but the latter were never required. Mr. Winnicke made a start from Cawarrie station, on the Warburton River, in latitude 28° S., and traversed the country to the north as far as latitude 27°, effecting a connection with previous explorations near Goyder's Pillars. A most remarkable natural feature in the Tailton Range was discovered by Mr. Winnicke during his Herbert River explorations. Several long stages without water were encountered a few days after the party left Cawarrie station, and a distance of 200 to 300 miles had to be traversed across the highest sand ridges in Australia before water could again be obtained. Many more long stages of between 100 and 200 miles without water were travelled. In many instances the sand ridges, which were from 300 to 400 feet high, and very steep, had to be crossed at right angles. Two large rivers and an extensive range were discovered near the Queensland boundary, and altogether Mr. Winnicke succeeded in mapping about 40,000 square miles of unknown country, which will help to fill in another large blank space on the map of Australia.

MR. O'NEILL, who arrived at Mozambique on February 4, after having traversed 1400 miles of unexplored country, situated between Mozambique and Lake Nyassa, has discovered Lake Amarambu, the existence of which was previously unknown, and which he declares to be the true source of the Pienda (?) River. Mr. O'Neill reports Lake Shirwa to be smaller than has been represented. On his return Mr. O'Neill followed the Likelungo Valley, which he found to be well populated.

DR. CHAVANNE will start in a few days on his expedition to the interior of Africa, undertaken for the Belgian "Institut National de Géographie." He will employ the first eight months of his time in drawing up an accurate chart of the Congo; and then penetrate from Leopoldville to the north to explore the hitherto unknown districts lying in that direction and the water-courses. It must depend on circumstances whether he will effect his return along the Nile, by Zanzibar, or by the Congo. The provisional chart of the Congo, which was published a short time since in America, is now sold here.

IN vol. xix. of the *Izvestia* of the Russian Geographical Society we find the results obtained by M. Grinevetsky during his journey across Novaya Zemlya in the spring of 1878. The country is a plateau, about 450 feet above the sea-level, with deep valleys in which several lakes are concealed. The rivers cut deeply into the plateau. The south-eastern winds blow freely on the plain, denuding it of its snow covering. Three different parts may be distinguished in the southern island of Novaya Zemlya: the northern part, which is covered by mountains quite unknown, is bounded on the south by the Pukhovaya River. The middle part is covered by five or six parallel chains of hills, the highest summits of which reach 800 feet; they run north-west, close to the western coast, having a wide plateau to the east. The southern part is a plateau not more than 450 feet high, and M. Grinevetsky doubts very much if there are mountains 2000 feet high, as has been stated. One observation of M. Grinevetsky is worthy of notice. It is most probable, he says, that there are two varieties of reindeer in Novaya Zemlya. One of them inhabits the southern island, and the other, which does not mix with the former, inhabits only the northern island; it is said by the hunters to be much like that of Spitzbergen. In fact the Russian hunters have found very often on Spitzbergen a kind of reindeer with cut ears, which, they are persuaded, comes from Novaya Zemlya. In the Report of the Polar Commission in the *Izvestia* of the Russian Geographical Society (1871) reasons were given for believing, along with Baron Shilling, in the existence of an archipelago to the north-west of Novaya Zemlya (the feebleness of the cold sea current in Barents Sea, and the large quantities of mud and gravel seen on the floating ice north-west of Novaya Zemlya). The remark of the hunters was also referred to, and the opinion expressed that, if such an archipelago existed, the Novaya Zemlya reindeer really might cross the sea during favourable years, reach this archipelago, and thence continue their migrations to Spitzbergen. The discovery of Franz Josef Land renders this supposition still more probable, especially if the Franz Josef archipelago extends farther to the east, which extension seems most probable, on account of the feebleness of the polar current that enters Barents Sea, which surely would be much stronger if the space between Novaya Zemlya and the North Pole were occupied entirely by an open sea. The observation of M. Grinevetsky again raises this question: Is it true that the Novaya Zemlya reindeer afford so many distinct affinities with the Spitzbergen reindeer as to be considered as belonging to the same sub-variety? And if so, how explain these affinities without admitting (as the hunters do) that the reindeer in his migrations

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goes from Novaya Zemlya over to Spitzbergen, availing himself of the archipelagos scattered between the two islands?

In Nos. 9 and 10 of vol. x. of the *Transactions of the Berlin Geographical Society*, is an address on the wild tribes of Madagascar, by Herr J. Audebert, who divides them collectively, both those of Malayan (the Hovas) and those of African descent, according to their mode of life, into three classes: the inhabitants (1) of the coast; (2) of the woods; (3) of the grassy lands and steppe-like wastes of the southern interior. Of all the races the Sakalavi are first in point of number, power, and civilisation. The aborigines, or Malagasy proper, are generally of a dark complexion, though those of direct Arabian descent are very clear-skinned, with hard features, broad, often also high forehead, eyes wide apart, nose flat, lips prominent, but not swollen, mouth broad, with splendid teeth. The long rather woolly hair is worn in innumerable plaits woven, in the case of the women, into crowns, vaccine ears, snail-shells, &c., smeared with tallow and ashes into the hardness of stone, and very malodorous. In the grassy interior cattle-rearing is the principal industry: on the coast fishing and the cultivation of rice. In the woods the people live on roots, tubercles, and honey.—Next follows an interesting though brief account of Dr. Stecker's chequered travels, of nearly three years' duration, through Abyssinia. About the middle of February, 1881, when Dr. Rohlfs left Debra Tabor, Dr. Stecker made his way to the Tana Lake, which he travelled round, sending a detailed map of it, executed on the spot, to the German African Society. At Zabul, the recently-acquired seat of King John, Dr. Stecker drew a plan of the grand and interesting chain of mountains traversing the eastern part of Abyssinia, but both report and map failed to reach the German African Society, whither they were directed. Dr. Stecker was bent on penetrating into Koffa, but on account of war tumults and King John's refusal to give him permission, was obliged to abandon his design. He, however, joined the three kings, King John, the King of Shoa, and the Negus Tekla Haimanot into the Eastern Gala lands of Komboltsha, Antsharo, Tshaffa, Rikke, and Argobba, and was thus enabled to make first acquaintance with a tract of country never before trodden by a European.—Some interesting particulars of travels in South America are taken from a letter of Dr. G. Steinman to Dr. W. Reiss, dated November 5, 1883.—The stones collected by Herr P. Güssfeldt on the north-west slopes of Aconcagua, at a height of from 5500 to 6100 metres have been analysed by Prof. J. Roth of the Academy of Sciences, and the result has established beyond all further doubt the fact that Aconcagua is a volcano.

THE ORIGIN OF THE SCENERY OF THE BRITISH ISLANDS[1]

A TRUE mountain chain is the result of a local plication of the earth's crust, and its external form, in spite of sometimes enormous denudation, bears a close relation to the contours produced by the original uplift. Tried by this standard, hardly any of the heights of Britain deserve the name of mountains. With some notable exceptions in the south of Ireland, they are due not to local but to general upheavals, and their outlines have little or no connection with those due to underground movement, but have been carved out of upheaved areas of unknown form by the various forces of erosion. In the course of their denudation the nature of these component rocks has materially influenced the elaboration of their contours, each well-marked type of rock having its own characteristic variety of mountain forms. The relative antiquity of our mountains must be decided not necessarily by the geological age of their component materials, but by the date of their upheaval or of their exposure by denudation. In many cases they can be shown to be the result of more than one uplift. The Malvern Hills, for example, which from their dignity of outline better deserve the name of mountains than many higher eminences, bear internal evidence of having been upheaved during at least four widely separated geological periods, the earliest movement dating from before the time of the Upper Cambrian, the latest coming down to some epoch later probably than the Jurassic period. The oldest mountain fragments in Britain are those of the Archæan rocks, and of these the largest portions occur in the north-west of Scotland. Most of our mountains, however, belong to upheavals dating from Palæozoic time, though the actual exposure and shaping of them into their present forms must be referred to a far later period. Two leading epochs of movement in Palæozoic time can be recognized. Of these the older, dating from before the Lower Old Red Sandstone and part at least of the Upper Silurian period, was distinguished by the plication of the rocks in a dominant north-east and south-west direction, and the effects of these movements can be traced in the trend of the Lower Silurian ridges and hollows to the present day. In Wales two types of mountain-form exist—the Snowdon type, and that of the Breconshire Beacons. In the former the greater prominence of the high grounds arises primarily from the existence of masses of volcanic rocks, which from their superior durability have been better able to withstand the progress of degradation. In the latter the heights are merely the remaining fragments of a once continuous tableland. The Lake District presents a remarkable radiation of valleys from a central mass of high ground. It might be supposed that these valleys have been determined by some radiating system of fractures in the rocks; but an examination of the area shows them to be singularly independent of geological structure. So entirely do they disregard the strike, alternations, and dislocations of the rocks among which they lie that the conclusion is forced upon us that they have been determined by some cause wholly independent of structure, and before the present visible structure was exposed at or could affect the surface. This could only have happened by the spread of a deep cover of later rocks over the site of the Lake mountains. The former presence of such a cover, which is demanded for the explanation of the valleys, can be inferred from other evidence. The Carboniferous Limestone on the flanks of the Lake District is so thick that it must have spread nearly or entirely over the site of the mountains. But it was overlaid by the Millstone Grit and Coal-measures so that the whole area was probably buried under several thousand feet of Carboniferous strata which stretched continuously across what is now the north of England. At the time of the formation of the anticlinal fold of the Pennine Chain the site of the Lake District appears to have been upraised as a dome-shaped eminence, the summit of which lay over the tract now occupied by the heights from Scafell to Helvellyn. The earliest rain that fell upon this eminence would gather into divergent streams from the central watershed. In the course of ages, after possibly repeated uplifts, these streams have cut down into the underlying core of old Palæozoic rocks, retaining on the whole their original trend. Meanwhile the whole of the overlying mantle of later formations has been stripped from the dome, and is now found only along the borders of the mountains. The older rocks yielding to erosion, each in its own way, have gradually assumed that picturesqueness of detail for which the area is so deservedly famous. The Scottish Highlands likewise received their initial plications during older Palæozoic times their component rocks having been thrown into sharp fold, trending in a general north-east and south-west direction. But there is reason to believe that they were in large measure buried under Old Red Sandstone, and possibly under later accumulations. No positive evidence exists as to the condition of this region during the vast interval between the Old Red Sandstone and the older Secondary rocks. We can hardly believe it to have remained as land during all that time, otherwise, the denudation, vast as it is, would probably have been still greater. Not improbably the region had become stationary at a base-level of erosion beneath the sea; that is, it lay too low to be effectively abraded by breaker-action, and too high to become the site of any important geological formation. The present ridges and valleys of the Highlands are entirely the work of erosion. When they began to be traced the area must have presented the aspect of a wide undulating tableland. Since that early time the valleys have sunk deeper and deeper into the framework of the land, the ridges have grown narrower, and the mountains have arisen, not by upheaval from below, but by the carving away of the rest of the block of which they formed a part. In this evolution, geological structure has played an important part in guiding the erosive tools. The composition of the rock-masses has likewise been effective in determining the individuality of mountain-forms. The mountains of Ireland are distributed in scattered groups round the great central plain, and belong to at least three geological periods. The oldest groups probably took their rise at the time of the older Palæozoic upheaval, those of the north-west being a continuation of the Scottish Highlands, and those

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[1] Abstract of second lecture given at the Royal Institution, February 5, by Archibald Geikie, F.R.S., Director-General of the Geological Survey. Continued from p. 325.

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